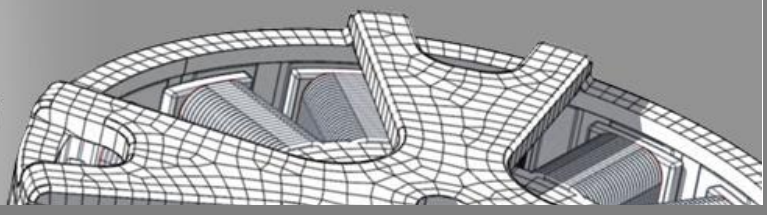


Application: Electromagnetic-Compatibility

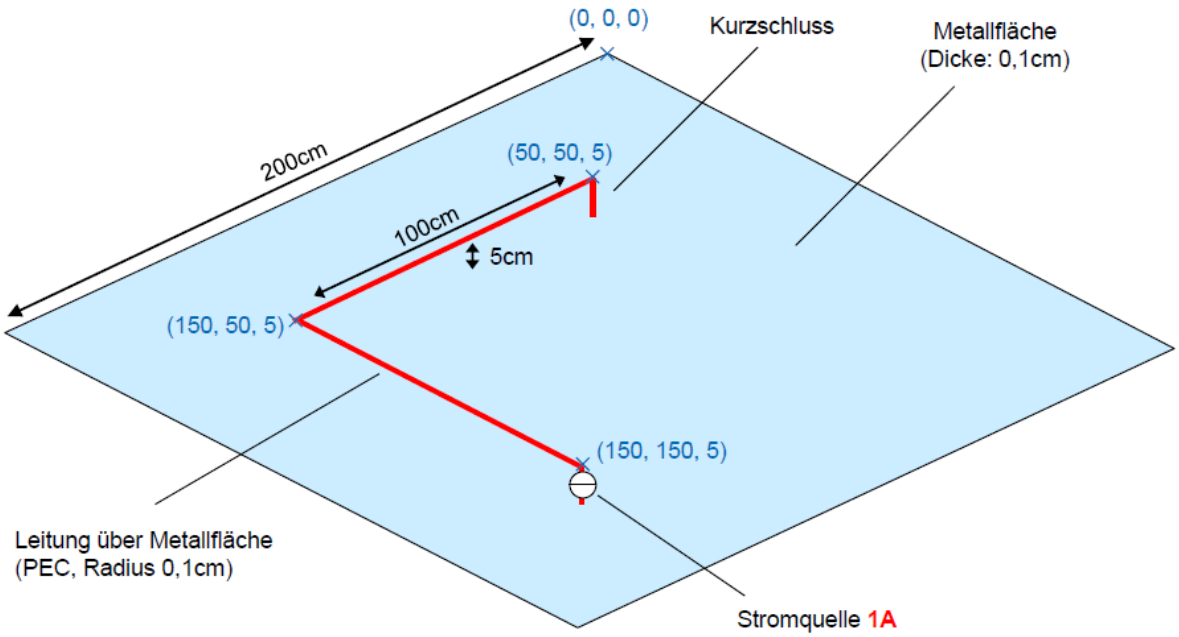
Initial Situation

AC-Cable near Body Sheet

This example shows an L-shaped cable bearing alternating current. The cable runs near to a body sheet of a car. At both ends it is connected to the body sheet so the current runs as well through the cable as well through the sheet. The question is how the alternating current will affect the sheet. Different frequencies have to be analyzed and also different material conductivity-values.

The goal is to analyze the current distribution on a sheetmetal in frequency domain.

Requested frequencies:
1 Hz, 25 Hz, 50 Hz, 200 Hz, 1000 Hz



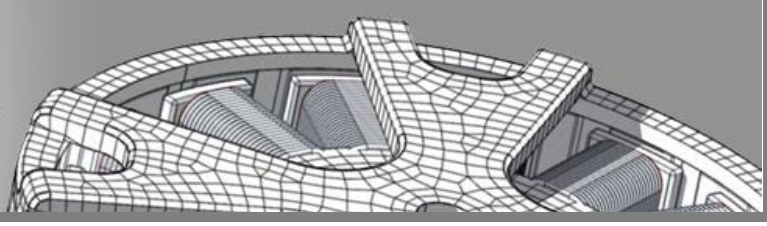
Picture: L-Model for EMC Tests

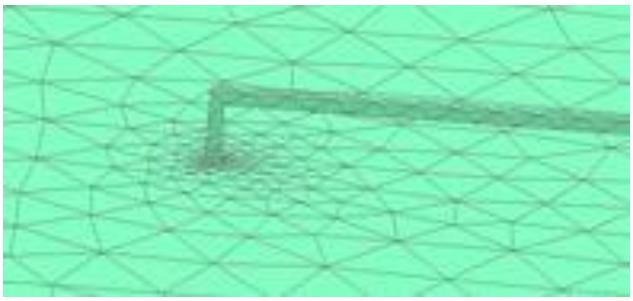
Appropriate Method

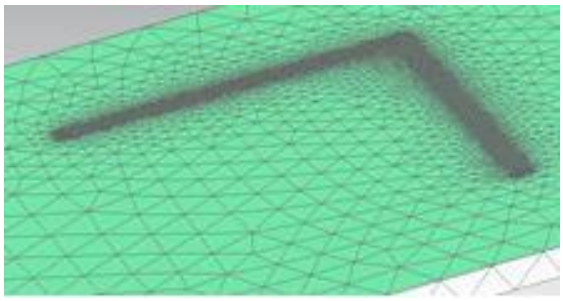
3D Magnetodynamic Frequencydomain Analysis

The cable and body sheet are CAD-modeled in NX. Also the air volume between them is modeled. In NX Advanced Simulation a Magnetics solution of type 3D Magnetodynamic Frequency is chosed. The forcing frequency is set to the demanded values. Meshing and material assignments complete FEM model. The solve process is repeated for the different frequencies.

The picture shows the mesh with the focus on the connection between the cable and the sheet. The next picture shows the mesh displayed from the buttom of the sheet. You can see the refinement in the area of the cable





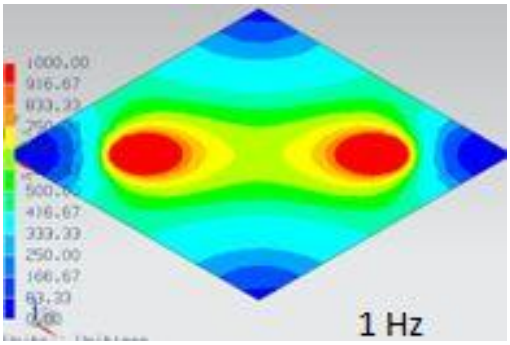


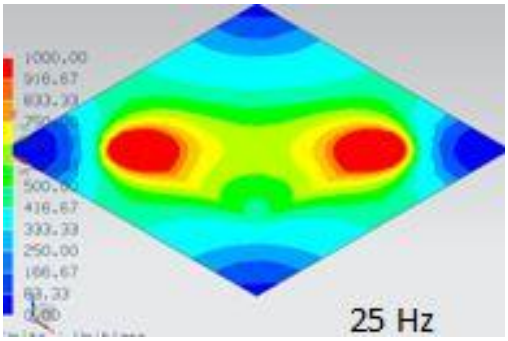
Result

Eddy Currents in Body Sheet

The results show the current distribution (Eddy Currents) of the induced current in the body sheet. It is clear to see that the higher the frequency becomes the more the eddy currents move to the L-shaped cable. With these results the customer can decide about the appropriate position of sensitive hardware devices.

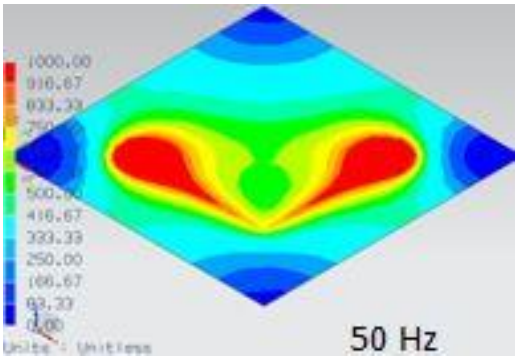
The first picture shows the current distribution at 1 Hz. The current in the sheet is nearly not affected by the AC cable. It runs in the shortest way through the sheet.

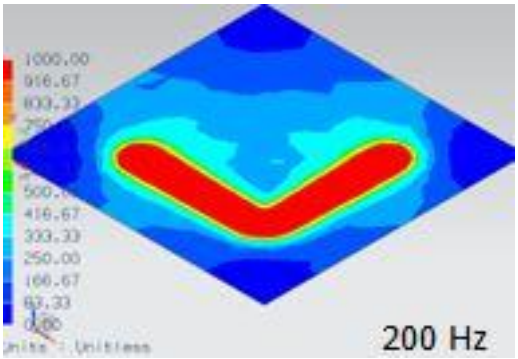




The second picture shows the results of frequency 25 Hz. A small deviation compared to the 1 Hz result can be seen. Still there is nearly no effect of eddy currents.

The next picture shows the currents at 50 Hz. Notice the currents now being affected by the L-shaped cable. They more and more move to the position of the cable.





With 200 Hz as shown in the last picture the eddy currents have fully moved to the position of the L-shaped cable.